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ABSTRACT

To examine the influence of imperfect audition in otherwise intact infants on early mother-infant interaction, three hard of hearing and three normally hearing infants were videotaped in interaction with their mothers. Interaction was coded, a narrative record of the mothers' nonverbal behavior was made, and transcripts of interviews with the mothers of hearing impaired infants were reviewed. Findings showed that at each age, hard of hearing infants spent more time looking at their mothers' hands than did the normally hearing infants; the two groups of infants showed similar patterns of expression of affect; mothers of hard of hearing infants produced more gestures than did mothers of hearing infants at both 10- and 12-month sessions, and appeared more hurried and eager to maintain their infants' visual attention than the other mothers; and each of the mothers of hard of hearing infants expressed concerns and worries about their child's speech and language development. The mothers' anxieties appeared to be translated into an overinterpretation of the negative effects of the infants' hearing loss leading to overprotection and simplification of play behaviors. (CL)

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Anxious Mothers and At-Risk Infants: The Influence of Mild Hearing Impairment on Early Interaction

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Anxious Mothers and At-Risk Infants: The Influence of Mild Hearing Impairment on Early Interaction

Introduction:

Although more than 300,000 children with mild to moderate hearing impairments are enrolled in the public schools, very little research has been conducted with this population. An audiologist has referred to them as "our forgotten children" (Davis, 1979). These children are at-risk for speech and language delay as well as social isolation, difficulties with peer interaction, and academic problems (Davis, Elfenbein, Schum, & Bentler, 1986). Parents find their behaviors ambiguous: with appropriate hearing aids they can process auditory information, but their responses are unpredictable. As adults, they may remain poised between deaf and hearing worlds. This paper reports a first effort to explore the influence of imperfect audition in otherwise intact infants on early mother-infant interaction, with special attention to the possible role of heightened anxiety for mothers.

Method/Subjects:

Three hard-of-hearing and three normally hearing infants were videotaped in face-to-face interaction with their mothers for ten minutes at three different times (when infants were ten, eleven, and twelve months old). Characteristics of subjects are given in Table 1. The data reported in this paper include results of quantitative analyses of mother and infant interactive behaviors and qualitative analysis of mothers' responses to interviews conducted at the time of each taping session.

The first three minutes of each interaction session were analyzed in 1/3-second units using a modification of the monadic phase coding system devised by Tronick, Als, and Brazelton (1980). (Coding system is delineated in

Table 2). Proportion of time spent in each code state was compared for mothers and infants in the two groups.

A narrative descriptive record of mothers' non-verbal behaviors was made for the first three minutes of 10- and 12- month-old tapes. Behaviors were categorized as "arm/hand gestures" (pointing, opening/closing fist), "arm/hand gestures which create sound" (snapping fingers, drumming fingers on table), "head or body movements" (shaking head yes/no, moving body side-to-side or toward-away from infant), "contacting or holding infant", "moving or manipulating infant". Number of different behaviors produced and frequency of each category of behavior were compared for the two groups of mothers at each age.

Finally, transcripts of interviews with the mothers of hearing-impaired infants were reviewed to identify the mothers' areas of concern, evidence of their understanding of the effects of the infant's hearing loss, and reports of modifications in maternal interactive behaviors in response to knowledge of the hearing loss.

Results:

Due to the small number of subjects, results reported here must be viewed as preliminary. Some consistent trends were found, however, and are discussed below:

1. Proportion of time spent in various monadic phase code states (Table 3) (Note 1). At each age, hard-of-hearing infants spent more time looking at their mothers' hands than did the normally-hearing infants. The hard-of-hearing infants looked at mothers' hands for 21% of the 10-month session, 10% of the 11-month session, and 13% of the 12-month session. The corresponding figures for hearing infants are 10%, 4%, And 5%. The hard-of-hearing infants looked away from their mothers somewhat less (40%, 42%, and 41% of the time) than did the hearing infants (46%, 58%, and 55% of the time).

The two groups of infants showed similar patterns of expression of affect, with neutral facial expressions predominating, positive facial expression next most common, followed by protest behaviors. The hard-of-hearing infants produced more protest behaviors at each age, however, than did the normally-hearing infants, for whom protest behaviors were practically non-existent.

Both groups of mothers spent the overwhelming proportion of the time looking at rather than away from their infants. The mothers displayed more positive affect than did the infants at each taping age; no consistent trends for differences in expressions of affect occurred between the two groups of mothers. The pattern of changes over time in proportion of positive and neutral affect followed a similar pattern for mothers and their infants within each group: hard-of-hearing infants and their mothers increased their amount of positive affect during 11- and 12- month sessions; hearing infants and their mothers both showed a decrease in positive affect at the 12-month sessions.

2. Mothers' production of non-verbal interactive behaviors.

(Table 4). The group of mothers of hard-of-hearing infants produced more gestures than did mothers of hearing infants at both 10- and 12-month sessions. There were large individual differences within each group, however. One mother of a hearing infant at 10 months and another at 12 months produced as many gestures as did any of the mothers in the other group. Only one mother (Mrs. Cathy) produced any sizeable number of imitations of her infant's non-verbal behaviors. Only two mothers demonstrated frequent visual following of the infants' gaze or pointing behaviors. This occurred in the 12-month sample for the two children (Angie and Cathy) who were pointing quite frequently at that time.

Impressions of persons who coded the tapes are that the group of mothers of hard-of-hearing infants appeared to be more hurried and more eager to

maintain their infants' visual attention than were the other mothers. These impressions are supported by work in progress which has found that the group of mothers of hard-of-hearing infants tended to initiate more new "topics" in the interactive sequences, while the group of mothers of hearing infants were more likely to follow their infants' lead in new activities or topics for interaction (Note 2). Again, however, one mother of a hearing infant behaved in a similar fashion to the mothers with hard-of-hearing infants.

3. Mothers' interview responses. Each of the mothers of hard-of-hearing infants expressed on-going concerns and worries about her infant's development of speech and language. Each mother could give an adequate audiological description of her infant's hearing loss, but at other times would present a very different picture of the loss--one that was worse than the audiogram would suggest. The mother of the infant with the mildest loss, whose better ear functions very near the normal range (unaided), said that she dreaded his being taunted by neighborhood children later because "...he won't be able to hear them when they shout at him." Another mother, who described her son as hearing "almost normally with both his aids in," later commented that "He screams a lot and he doesn't know when he's screaming...."

The third mother, referring to an older hearing-impaired sibling whose better ear functions in the mild-to-moderate range, commented, "I don't know how she learned to talk." In each case, the comments were representative of concerns more appropriate for children whose hearing loss is more severe than that of these subjects.

Some degree of confusion about the effects of the infants' hearing losses was not surprising, however. A major source of concern for the parents was the diagnostic process itself, both the initial diagnosis and the extended period of follow-up testing needed to define the extent of the hearing loss in order to prescribe and test the hearing aids. This period extended beyond the

12-month taping for all three infants, despite the fact that hearing loss was identified in two of the children by three months of age and by eight months for the third. Two of the three infants had repeated ear infections during the first year of life. This caused fluctuations in the infant's hearing ability, complicated testing to define the loss, and suggested to the mothers the possibility that the losses could worsen. This fear was appropriately strongest for the mother of the child whose hearing loss had been caused by meningitis.

Two of the three mothers had a difficult time obtaining the initial diagnosis of their infants' hearing losses. Both had concerns about their infant's hearing, but were initially unable to obtain referrals or other assistance through their infant's physicians. One mother reported, "It seemed to have been such a hassle for me just to get what I wanted. Such a fight. And I'm not by nature an aggressive person. Only now I've become a terrible skeptic." All reported great emotional distress for themselves and their husbands upon receiving the initial diagnosis of the hearing loss, with varying degrees of recovery from that distress. As one mother explained, "I've come a long way. The first six months...all I did was cry....still sometimes I get very upset."

Other sources of stress reported for these mothers include lack of understanding and acceptance from extended family members, worries that the infants would lose or destroy the hearing aids, concern about the expense of the hearing aids (which had to be borne by the parents of the infants with congenital losses), worry that the hearing-impaired infant required so much time and attention that older siblings were being slighted, questions about the etiologies of the hearing losses, and feelings of guilt. According to one mother, "I think back on that (the infant's illness) and, gee, I wonder if I couldn't have taken better care of him somehow." Another, whose infant has a congenital loss, reported that she was "afraid to have any more children."

All three mothers reported that they modified their behaviors with their infants due to the hearing loss. One mother "talks louder" and talks more to her infant because of the hearing loss. Another tries to "keep play simple." The third said, "...I try my darn'dest not to let him get too far away from me."

Discussion/Conclusions:

1. There are suggestions from the monadic phase data that dyadic face-to-face interaction may proceed somewhat differently for mothers with hard-of-hearing infants compared to dyads in which mother and infant both have normal hearing. The increased occurrence of negative affect (protest) from the hard-of-hearing infants and their increased levels of attending to their mothers instead of other environmental stimuli may indicate that more energy and attention are being required from these infants during face-to-face interaction.

2. Reciprocity in mother-infant interaction is suggested for both groups, however, in the parallel manner in which proportions of positive affect increase and decrease for mothers and infants. The co-occurrence of increased maternal productions of gestures and infant attention to mothers' hands for the dyads with hard-of-hearing infants also indicates that these dyads are interacting in a mutually-reinforcing, reciprocal manner. The fact that more positive affect is observed from the hearing mother/hard-of-hearing infant group at the later tapings suggests that these dyads may be successfully learning to negotiate and modify their interactive behaviors to produce more pleasurable, and thus more positively reinforcing, interactive experiences.

3. Earlier work has concluded that it is not possible to predict hearing-impaired children's later language or educational performance from their degree of hearing loss alone (Davis et al., 1986). Similarly, it does not appear possible to predict the amount of anxiety and stress the mother of a

hearing-impaired infant will experience based upon the degree of hearing loss diagnosed. The mothers in this study experienced significant stress and on-going concern when learning that their infants were hearing-impaired, even though the impairments were relatively mild when the infants used hearing aids. The mothers' concerns appeared to be translated into an over-interpretation of the negative effects of the infants' hearing loss leading to some potentially counterproductive maternal interactive strategies of over-protection and simplification of play behaviors.

4. Research with an increased number of subjects should determine the degree to which the trends identified here are representative of the experiences of hard-of-hearing infants and their mothers. The effects of maternal anxiety on early maternal interactive behaviors should be further defined. Developmental outcomes associated with relative amounts of successful, reciprocal early interactions should be identified for this population of at-risk children.

NOTES

Note 1: We wish to thank Dr. Robert MacTurk for providing the computer analysis of the monadic phase data used in this paper.

Note 2: Pat Spencer Day is working with Mary Gutfreund of the University of Bristol, England, on a dialogic analysis of the pre-verbal communicative behaviors of these dyads.

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TABLE 1
CHARACTERISTICS OF SUBJECTS: (A) INFANTS; (B) PARENTS

(A) Infants	Ages at taping (weeks)	Sex	Birth order	Hearing loss[1]
Group 1: hard-of-hearing infants				
RUTH	44,48,54	F	Second	Moderate-to-severe
PAUL	44,48,56	M	Second	Mild to moderate-right ear[2] severe-left ear
SEAN	44,48,55	M	Second	moderately-severe
Group 2: hearing infants				
CATHY	41,48,54	F	First	None
DENNY	42,47,54	M	Second	None
ANGIE	43,49,56	F	First	None

(B) Parents	Mother		Father	
	Age	Ed.	Age	Ed.
Group 1:				
MR/MRS RUTH	33	B.A.+	35	B.S.
MR/MRS PAUL	37	B.A.+	50	B.A.+
MR/MRS SEAN	23	HS	33	HS+
Group 2:				
MR/MRS CATHY	34	M.A.	39	LLB
MR/MRS DENNY	34	M.A.	29	MPA
MR/MRS ANGIE	24	HS+	26	HS

[1] Characteristics of infants' hearing losses were still being defined as these data were gathered. Descriptions given above were those available at time of taping.
[2] Hearing loss reported to have improved to mild in right ear between 10 and 11 month taping sessions.

TABLE 2

MONADIC PHASE CODES

Code Name	Direction of Gaze	Affect
INFANT		
Protest	toward or away from Mom	negative + cry/ fuss/grimace
Avert	away from Mom—no clear focus	neutral/negative
Positive away	away from Mom—no clear focus	positive
Neutral to Mom (social attend)	toward Mom	neutral
Positive to Mom (social play)	toward Mom	positive
Positive to Mom w/ voc	toward Mom	positive & vocalization
*Neutral Mom's hands	towards Mom's hands	neutral
*Positive Mom's hands	towards Mom's hands	positive
Neutral to object	toward objects	neutral
Positive to object	toward object	positive
MOTHER		
Avert	away from infant--no clear focus	neutral/negative
Neutral to infant (social attend)	toward infant	neutral/negative
Positive to infant (play)	toward infant	positive
Positive to infant w/ talk	toward infant	positive & babytalk
Neutral elicit	toward infant	neutral/negative + attract attention
Positive elicit	toward infant	positive + attract attention
Neutral to object (object attend)	toward object	neutral
Positive to object (object play)	toward object	positive

( ) names used by other researchers
*codes additional to those used by Tronick et. al. (1980)

TABLE 3

A. Hard-of-Hearing & Hearing Infants at 10, 11, 12 Months
Monadic Phase Codes (% duration)

	Hard-of-Hearing			Hearing		
	10 mo.	11 mo.	12 mo.	10 mo.	11 mo.	12 mo.
Protest	5.43	8.09	6.29	.49	.43	-0-
Avert	15.93	17.28	13.77	18.70	23.25	23.85
Positive Away	5.56	5.19	3.15	1.42	2.65	.92
Neutral to Mom	23.15	14.20	17.34	27.72	16.09	25.12
Positive to Mom	8.70	21.05	20.74	15.31	20.24	13.27
Positive to Mom w/ Voc	.80	1.05	.19	.49	1.05	1.06
Neutral-Mom's Hands	18.21	6.05	11.67	7.35	2.65	2.85
Positive-Mom's Hands	3.21	4.32	1.42	2.41	1.42	2.47
Neutral to Object	17.41	18.64	18.69	23.39	31.35	30.13
Positive to Object	.74	.74	6.23	2.1	.68	-0-

B. Hearing Mothers of Hearing & Hard-of-Hearing Infants
at 10, 11 & 12 Months - Monadic Phase Codes (% duration)

Avert	1.30	.74	.19	.06	.92	.56
Neutral to Infant	53.15	41.17	38.95	45.49	32.56	52.15
Positive to Infant	24.81	43.83	43.27	39.75	46.21	28.52
Positive to Infant w/ Talk	4.14	-0-	-0-	1.97	2.84	1.44
Neutral Elicit	3.58	.43	1.11	.99	2.35	2.35
Positive Elicit	-0-	.19	-0-	.62	.25	1.91
Neutral to Object	12.22	12.41	15.06	9.44	12.40	10.17
Positive to Object	.74	1.23	1.42	1.30	2.47	2.97

TABLE 4

Non-Verbal Behaviors: Mothers of Hard-of-Hearing and Hearing Infants

A. 10 months

	Group 1 Hard-of-Hearing				Group 2 Hearing			
	Ruth	Sean	Paul	$\bar{X}$	Denny	Angie	Cathy	$\bar{X}$
Arm/Hand Gesture (with noise)	10	15	11	12.0	5	15	6	8.7
Arm/Hand Gesture	2	3*	19	8.0	2	4	1	2.3
[TOTAL GESTURE	12	18	30	20.0	7	19	7	11.0]
Body/Head Move	5/0	1/5	0/0		4/1	3/0	0/4	
Contact/Hold	7	4	7	6.0	13	7	3	7.7
Manipulate	8	8	5	7.0	18	4	0	7.3
Imitate	0	0	0		2	3	10	
Follow Gaze/or Point	0	0	0		1	0	0	
TOTAL NON-VERBAL	32	36	42	36.7	46	36	24	35.3

B. 12 months

	Ruth	Sean	Paul	$\bar{X}$	Denny	Angie	Cathy	$\bar{X}$
Arm/Hand Gesture (with noise)	6	6	6	6.0	15	7	2	8.0
Arm/Hand Gesture	17	8	20	15.0	11	3	2	5.3
[TOTAL GESTURE	23	14	26	21.0	26	10	4	13.3]
Body/head move	3/1	3/2	0/1		4/0	0/1	2/0	
Contact/hold	9	5	8	7.3	4	3	2	3.0
Manipulate	0	19	8	9.0	14	5	0	6.3
Imitate	1	0	0		0	2	2	
Follow gaze/or point	0	0	0		0	11	13	
TOTAL NON-VERBAL	37	43	43	41.0	48	32	23	34.3

*These were verbal productions of the sign "no" but are included here due to their visual similarity to the gestures recorded.